



# PALESTINE MONETARY AUTHORITY (PMA)

## EFFECTIVE EXCHANGE RATE INDICES FOR PALESTINE

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## LIST OF ABBREVIATIONS

CIM	Price indicator of the cost of imported goods and services expressed in domestic currency
CIMPT(NONGIM)	Cost of imports in PT with NONGIM weights
CIMPT(TIM)	Cost of imports in PT with TIM weights
CPI	Consumer Price Index
CPIPT	CPI in PT
EER	Effective Exchange rate index
IM	Total Imports
NEER	Nominal Effective Exchange Rate index
NEERIL(IMF)	NEER calculated for Israel by the IMF
NEERPT(EXP)	NEER for PT with export weights
NEERPT(NONGIM)	NEER for PT with NONGIM weights
NEERPT(TIM)	NEER for PT with total import weights
NIS	Shekel per USD
NONGIM	Non-Oil and Non-Gas Imports
REER	Real Effective Exchange Rate index
REERIL(IMF)	REER calculated for Israel by the IMF
REERPT(EXP)	REER for PT with export weights
REERPT(NONGIM)	REER for PT with NONGIM weights
REERPT(TIM)	REER for PT with total import weights
PT	Palestine
S	nominal bilateral exchange rate USD per national currency
ULC	Unit Labor Cost
USD	US Dollar

# EFFECTIVE EXCHANGE RATE INDICES FOR PALESTINE

## 1. INTRODUCTION

Effective exchange rate indices (EER) are weighted averages of bilateral exchange rate indices and therefore provide a more general view of a country's stance in the foreign exchange markets. Several kinds of EER can be calculated according to the purpose of analysis for which they can be used. Two main broad categories can be distinguished:

- Nominal effective exchange rate indices (NEER) provide a weighted average of a country's nominal bilateral exchange rates, indexed on a chosen base year;
- Real effective exchange rates indices (REER) correct the NEER for relative price developments.

National and international organizations calculate for each of these categories different kinds of EER according to different methodologies. The IMF calculates different versions of EER for its member countries<sup>1</sup>, according to different methods.

Zanello and Desruelle (1997) describe the methodology and the data used in the IMF's Information Notice System (INS) to calculate the effective exchange rates. They highlight the improvements to the INS implemented over 1994-96, including modifications to the computational methodology, use of updated data, and extension of the INS to recent Fund members. They computed the effective exchange rates in three different ways. The first is the unit labor cost (ULC)-based REER index for 21 industrial countries the second is the consumer price index (CPI)-based REER index for "old" Fund members, and the third is the CPI-based REER index for recent Fund members. The availability of detailed data is crucial for the way that the effective exchange rates are computed.

Bayoumi et al (2006) describe the result and the methodology of updating NEER and REER weights. The old weights are based on trade data from 1989 – 91, while the new weights are based on trade data from 1999 – 2001. Their results show a substantial change in the international trade relations. Outdated weights can lead to incorrect assessment of

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<sup>1</sup> The IMF methodology is explained in A. Zanello and D. Desruelle, A Primer on the IMF's Information Notice System, IMF Working Paper WP/97/71, and in T. Bayoumi, J. Lee, S. Jayanthi, New Rates from New weights, IMF Staff Papers VOL 53, Nr. 2, 2006.

development in the effective exchange rate, which is a key input for macroeconomic analysis of open economies.

In the old methodology, calculating the CPI-based REER depends upon bilateral trade weights on manufacturing, commodities, and tourism services sectors, while in the new methodology, as Bayoumi et al suggest, the bilateral trade weights must also include all services sectors not only tourism. On the other hand, Bayoumi et al suggest a uniform methodology to compute CPI-based indices for all Fund members not like the case in Zanella and Desruelle (1997).

In this paper we calculate different kinds of EER for Palestine (PT). Given limitations on data availability, these calculations will be based on the most simple of the approaches applied by the IMF. More specifically, the weights will be simply based on bilateral trade flows (both exports and imports) between PT and its main trading partners. That means, among others that no account will be taken of third market effects and also that all exports and imports will be treated as a composite good. But in this respect, also EER will be calculated excluding, as well as including, oil and gas. As to the REER, we will use relative Consumer Price Indexes (CPI) (The IMF also calculates REER on this basis, but for some other countries also uses Unit Labor Costs (ULC)).

Our main objective is to derive information on imported inflation and on the international competitiveness of PT. To that end, EER will be calculated using import weights and export weights respectively.

## **2. IMPORT WEIGHTED EER FOR PT**

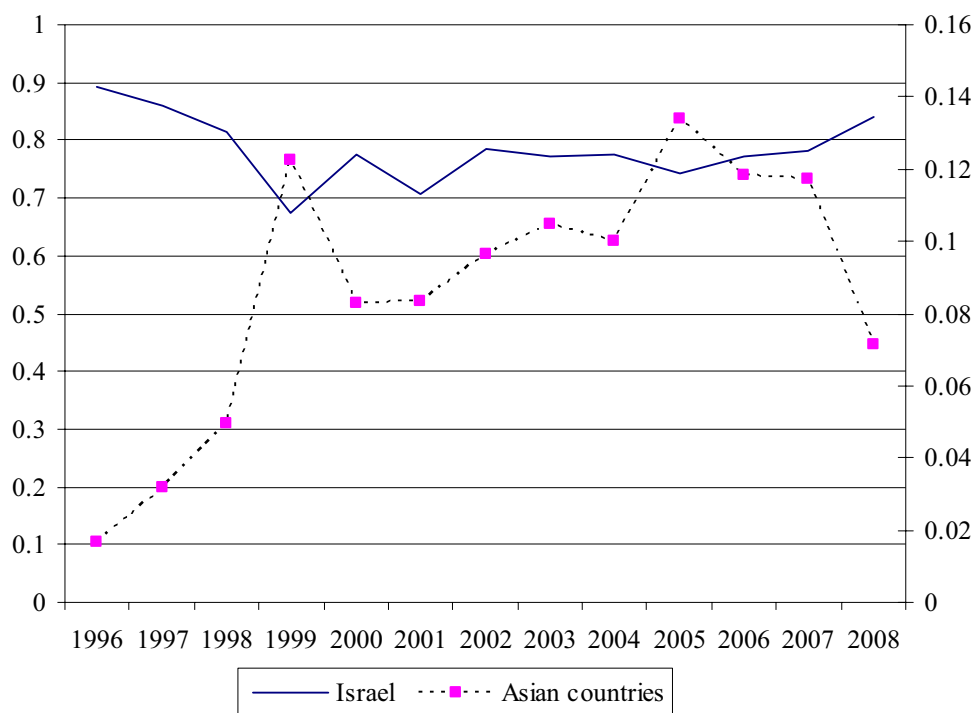
### ***2.1 Import weights used for PT***

Import weights are based on the bilateral geographical distribution of PT imports, both for total imports (IM) and non-oil, non-gas imports (NONGIM). These weights are calculated for each available year over the sample period 1996 – 2010 (bilateral import flows are available up to 2008; therefore weights will be assumed to be constant in the last three years of the sample period). **Table 1** shows the total import weights for each of the most important individual supplier countries and their movements over time. Imports from these selected countries represent around 95% of total imports in PT over the whole sample period. The table shows that Israel accounts for around 80% of total PT imports.

**Table 2** regroups the selected countries into different regions. The table and **chart 1** show that between 1996 up to 2005, the share of Asia was on a rising trend, but declined again afterwards. The share of Israel has been quite stable between 1998 and 2007.

Import shares were also calculated for non-oil/non-gas imports. Zanello and Desruelle (1997) suggest two reasons lie behind excluding oil and gaz from calculating import shares. First, in the short to medium term, trade in oil, gaz, and other energy products may be considered relatively insensitive to changes in exchange rates and domestic costs and prices. Second, in many oil-producing countries, the energy sector can be considered as segmented from the rest of the economy, except for the effect of energy revenues on state budget. The eventual effect of the energy sector on the rest of the economy is affected more by governemnt spending decisions that exchange rate variations. Bayoumi et al suggest another reason to exclude oil and gaz imports from calculating commodity weights, which is that the world oil market is strongly influenced by cartels (OPEC), and exchange rate variations have indirect effect s on the market.

**Chart 1: Total import shares of Asian countries (right hand scale) and Israel (left hand scale)**

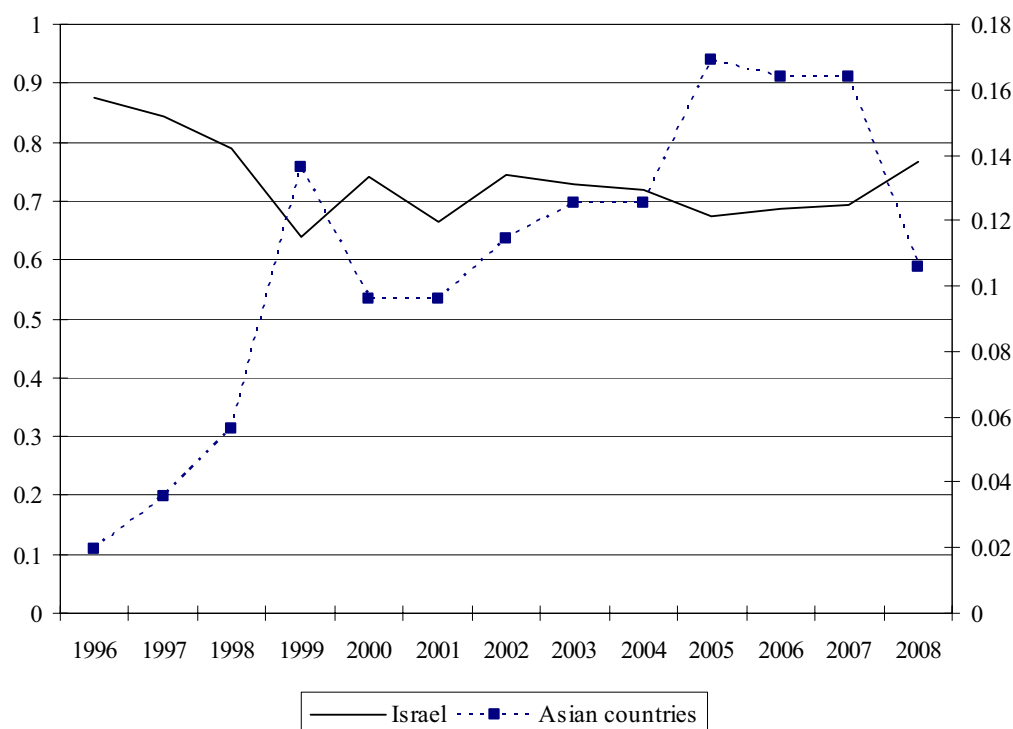


Oil and gas in PT are imported for the overwhelming part from Israel. Therefore total oil and gas imports are deducted of the bilateral PT imports from Israel. **Tables 3 and 4** show the geographical distribution of NONGIM. During recent years the share of imports from

Israel fluctuates around 70%. Asian region (and especially China) is now the second most important origin of PT imports.

**Chart 2** shows that up till 2005, the share of Israel was on a declining trend in favor of the Asian region, but these trends seem to have been reversed afterwards. In any case, the chart shows that very likely, import substitution between both these origin areas has taken place in the past, although in a relatively limited scope.

**Chart 2: Non-oil/non-gas import shares of Asian countries (right hand scale) and Israel (left hand scale)**



## 2.2 Import weighted NEER for PT

The weights shown in **tables 1 and 3** are used to construct two NEER's for PT based on total import weights and NONGIM weights respectively, according to the following formulae:

$$NEER_{IM} = \prod_{j=1}^{16} \left( \frac{S}{S_j} \right)^{w_{IMj}}$$

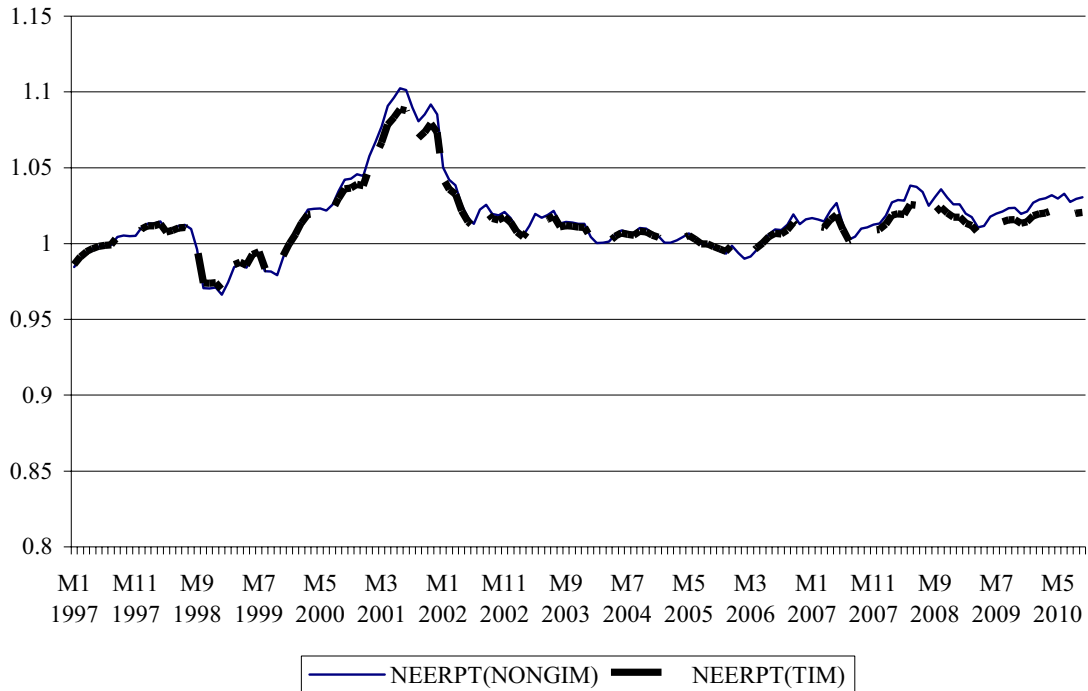
$$NEER_{NONGIM} = \prod_{j=1}^{16} \left( \frac{S}{S_j} \right)^{w_{NONGIMj}}$$

Where:

S      USD per NIS,

$S_j$  USD per country  $j$ 's currency

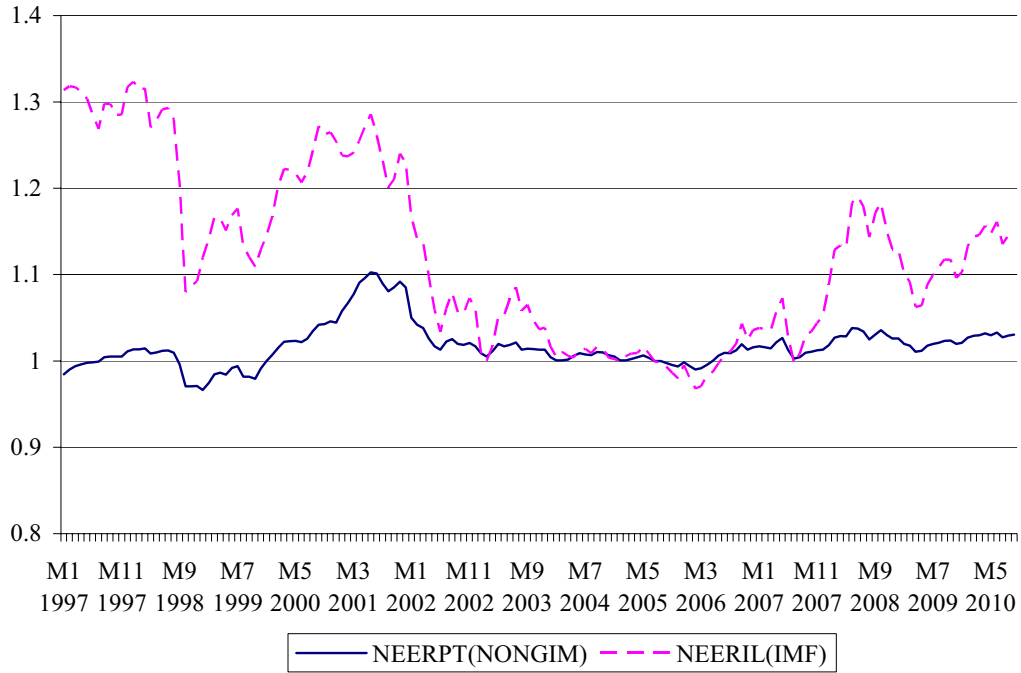
**Chart 3: NEER for PT with total import weights (TIM) and with non-oil/non-gas import weights (NONGIM)**



**Chart 3** presents NEER's for PT based on total import weights and NONGIM weights respectively. An increase in an effective exchange rate index should be interpreted as an appreciation of the local currency with respect to the exchange rates of its trading partners. In this case, because of the fixed exchange rate between PT and Israel, an increase in the NEER for PT denotes an appreciation of the NIS with respect to the other trading partners of PT. It is obvious from chart 3 that both nominal effective exchange rate indices are very strongly correlated. This mainly due to, first, all oil and gaz are imported from Israel, and thus no exchange rate effect on trading. Second, oil and gaz prices are highly correlated between PT and Israel.

Chart 4 compares the NEERPT with the NEER calculated for Israel by the IMF (NEERIL(IMF)). The NEER for PT and Israel are somewhat correlated, but because Israel has an important weight in PT imports and because both share the same currency, the NEER for PT is much more stable. After 2006, the NEER in Israel is on an upward trend, meaning a nominal effective appreciation of the exchange rate in Israel. In PT there was no significant upward nominal appreciation trend.

**Chart 4: NEER for PT and Israel**



### 2.3 Import weighted CPI-based REER for PT

The REER is calculated as the geometrically weighted average of the bilateral exchange rates adjusted for relative CPI, according to the following formulae:

$$REER_{IM} = \prod_{j=1}^{16} \left( \frac{S}{S_j} \cdot \frac{CPI_{PT}}{CPI_j} \right)^{w_{IM_j}}$$

$$REER_{NONGIM} = \prod_{j=1}^{16} \left( \frac{S}{S_j} \cdot \frac{CPI_{PT}}{CPI_j} \right)^{w_{NONGIM_j}}$$

The REER in PT on both total import weights and on NONG weights are very strongly correlated. It seems to be the case that the REER in PT has been on a rising trend since 2003. This means that the CPI in PT relative to its main trading partners and expressed in a common currency has been increasing, which can be interpreted as a declining trend in PT's competitiveness compared to its trading partners.



**Chart 5: REER for PT with total import weights (TIM) and with non-oil/non-gas import weights (NONGIM)**

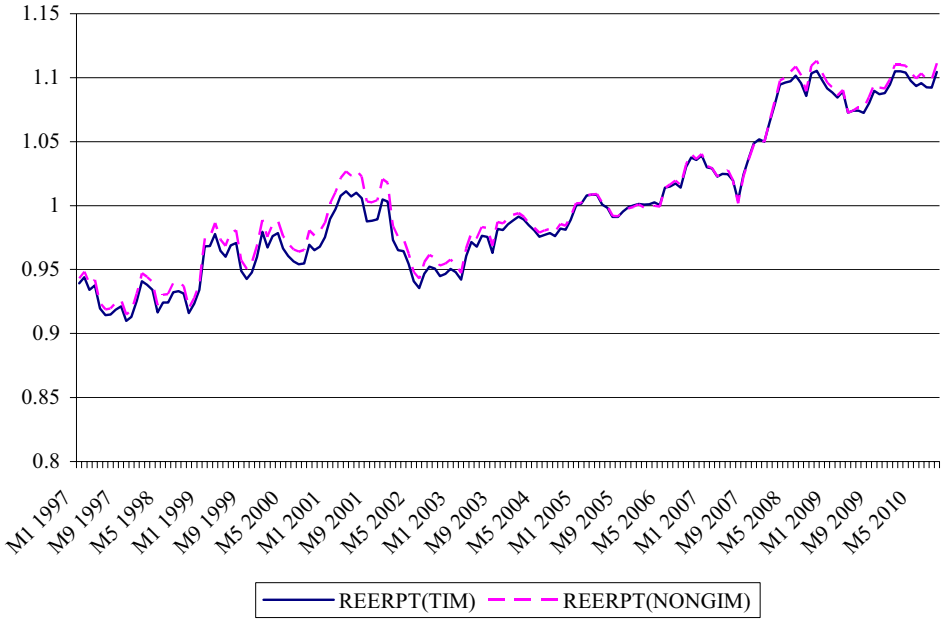
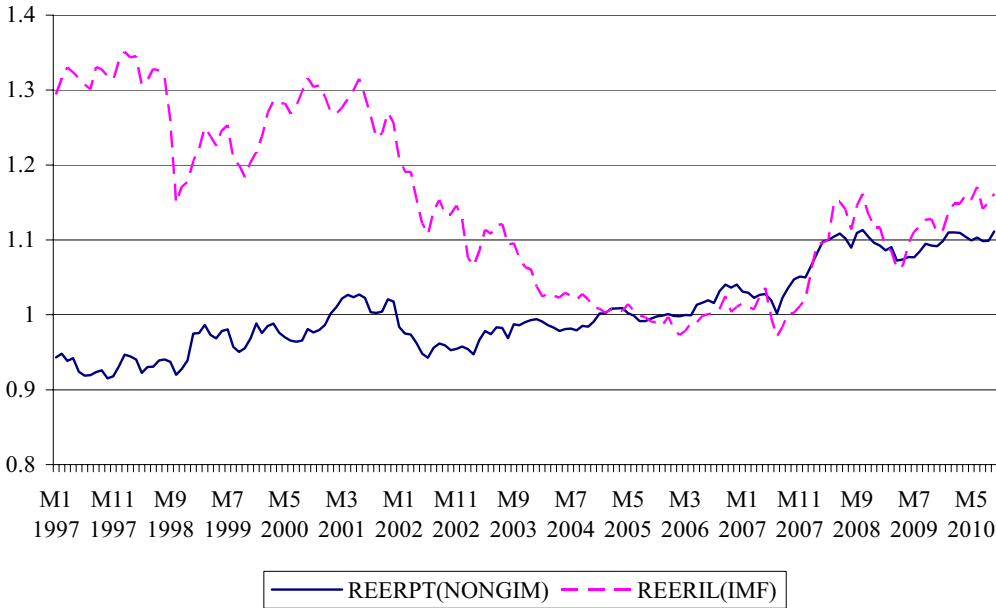


Chart 6 compares the CPI based REER of PT with the CPI based REER for Israel as calculated by the IMF. The chart show that Israel was enjoying an increase in its competitiveness compared with its trading partners up till 2007 in which its competitiveness is declining as a consequence to the appreciation in its currency with respect to its trading partners' currencies.

**Chart 6: REER for PT and Israel**



## 2.4 Indicator of imported inflation

Using the same data as those used for the calculation of the import weighted NEER and REER, the following indicator for cost of imports, expressed in local currency can be constructed according to the following formulae:

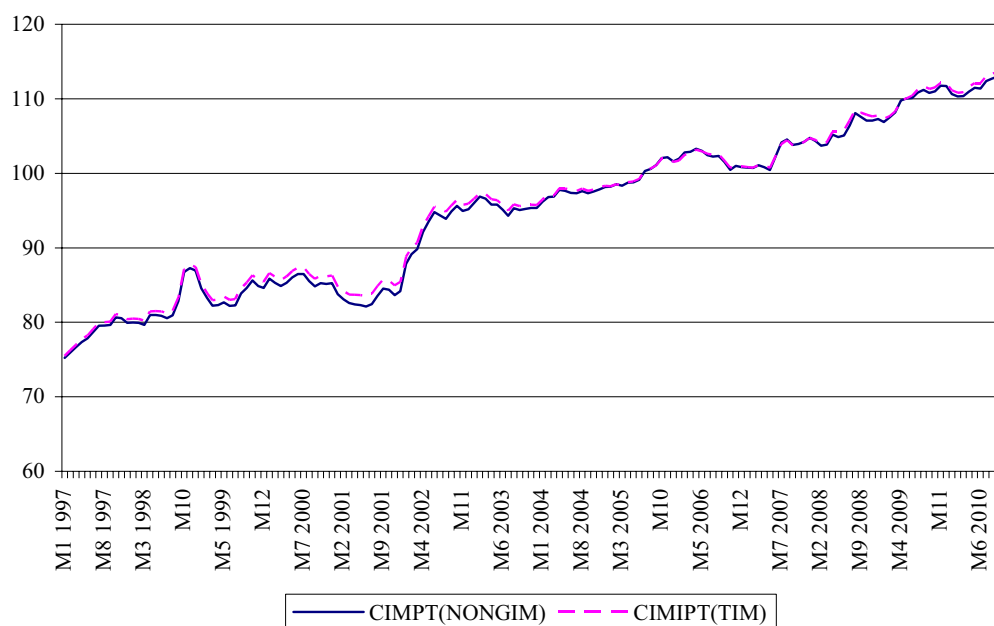
$$CIM_{IM} = \frac{1}{\prod_{j=1}^{16} \left( \frac{S}{S_j} \cdot \frac{1}{CPI_j} \right)^{w_{IM_j}}}$$

$$CIM_{NONGIM} = \frac{1}{\prod_{j=1}^{16} \left( \frac{S}{S_j} \cdot \frac{1}{CPI_j} \right)^{w_{NONGIM_j}}}$$

Where:

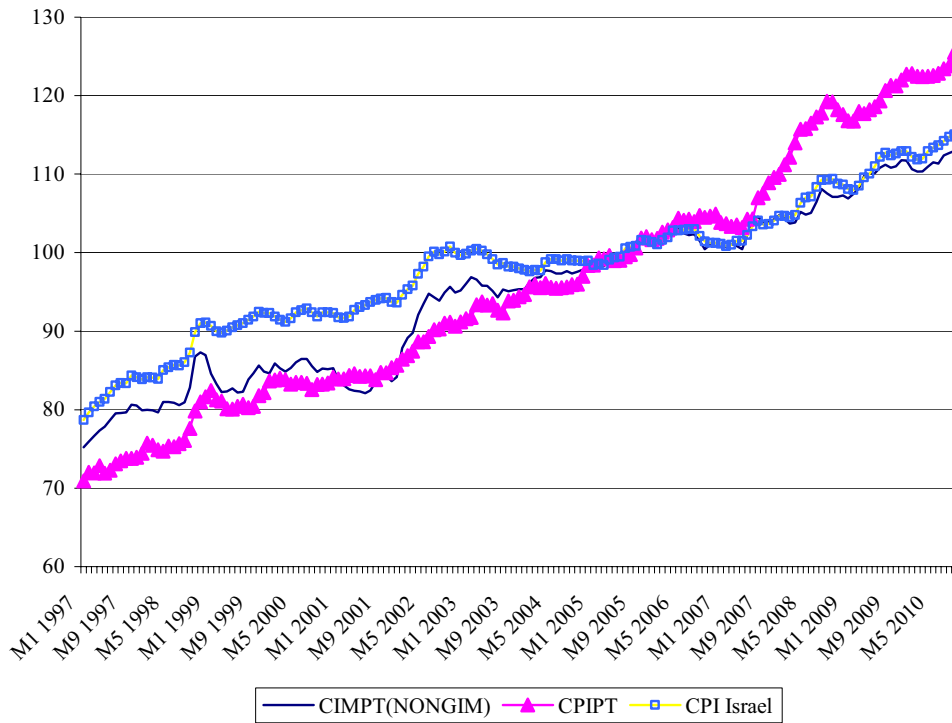
CIM Price indicator of the cost of imports expressed in domestic currency.

**Chart 7: Cost of import indicators in PT**



These indicators contain information concerning the imported inflation caused by movements in prices, converted in local currency, in the countries from which PT imports. Again it doesn't matter whether imports of oil and gaz are included in the weights or not. We expect a positive relationship between these indicators and the CPI in PT, which is confirmed by chart 8. That chart compares the CIM in PT with the CPI in PT and the CPI in Israel. In general there is a close correlation between the CIM and CPI in PT. Only in 2008 the PT CPI jumped upwards, but afterwards, the correlation resumed albeit on a different level.

**Chart 8: Cost of imports in PT compared to CPI in PT and Israel**



### 3. EXPORT WEIGHTED EER FOR PT

The NEER and REER with a focus on the export markets are calculated as follows:

$$NEER_{EXP} = \prod_{j=1}^{16} \left( \frac{S}{S_j} \right)^{w_{EXP_j}}$$

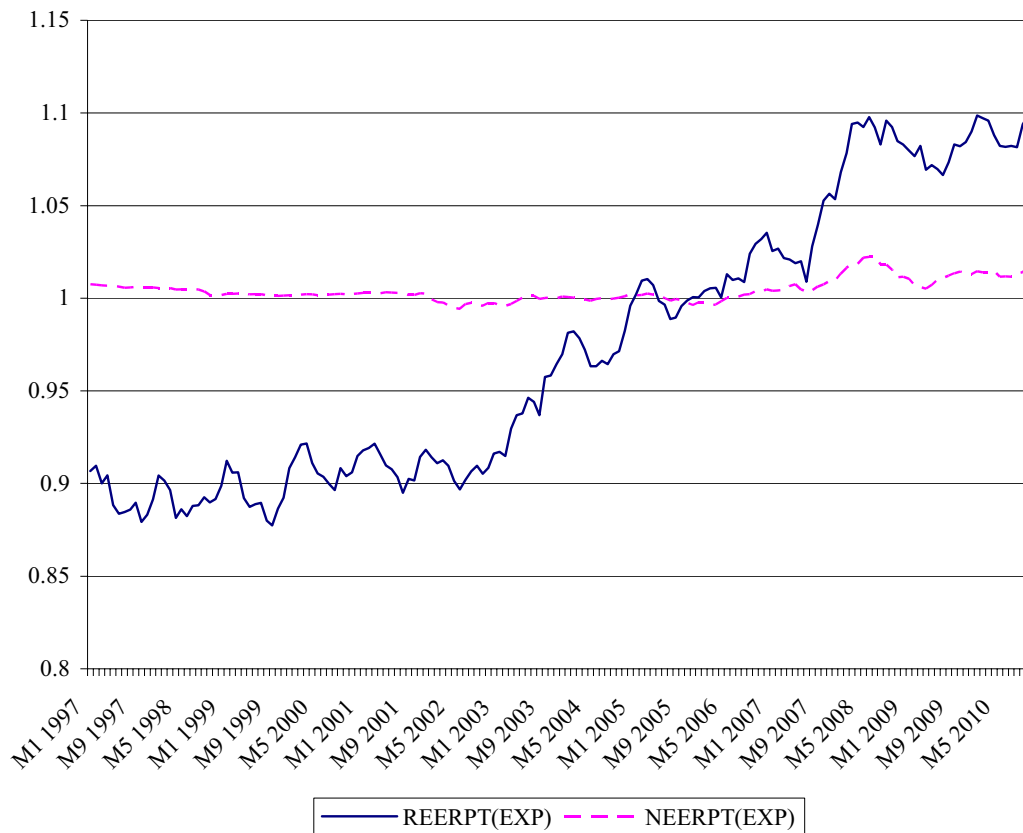
$$REER_{EXP} = \prod_{j=1}^{16} \left( \frac{S}{S_j} \cdot \frac{CPI_{PT}}{CPI_j} \right)^{w_{EXP_j}}$$

Where:

EXP = Export

The REER is normally used as an indicator for the country's competitiveness on its export markets. Chart 9 shows that the export weighted REER for PT has been on a rising trend since 2003, implying a declining degree of international competitiveness.

**Chart 9 Export weighted NEER and REER for PT**



#### **4. CONCLUSION**

Effective exchange rate indices were calculated for Palestine based on the simplest methods, which are also used by the IMF for a number of other countries. Besides effective exchange rates, also indicators of the costs of imports were calculated on the basis of formulas similar to those used for the effective exchange rates. Several observations can be made on the basis of these calculations:

- Correcting for oil and gas imports when calculating the weights does not make much difference. All calculated series including compared to excluding oil and gas are very close to each other;
- In recent years Israel accounted for around 70% of total no-oil/non-gas imports in Palestine. This share seems to have been relatively stable since 1998;

- The nominal effective exchange rate indices for PT are relatively stable. This is because PT trades with predominantly one trade partner with which it shares the same currency;
- The real effective exchange rate indices show an upward trend since 2003, implying a deteriorating degree of competitiveness on both the domestic and foreign markets. Because no such strong trend is observed in the nominal effective exchange rates, it implies a rising trend in the CPI of PT relative to its main trading partners, expressed in a common currency;
- There seems to be a close correlation between the computed import weighted cost of imports and the CPI in PT. The only exception is the strong CPI jump relative to the increase in the import cost in 2008. It suggests that import costs are an imported driver of inflation and should therefore be considered in the inflation analysis.

**Reference:**

A. Zanello and D. Desruelle, A Primer on the IMF's Information Notice System, IMF Working Paper WP/97/71.

T. Bayoumi, J. Lee, S. Jayanthi, New Rates from New weights, IMF Staff Papers VOL 53, Nr. 2, 2006.

PCBS, International Trade Statistics, different issues. [www.pcbs.gov.ps](http://www.pcbs.gov.ps)

International Financial Statistics (IFS), different issues. [www.imf.org](http://www.imf.org)

**Table 1: Total import weights of selected countries**  
(In percentage points)

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Jordan	0.36%	1.16%	2.53%	2.18%	1.10%	1.24%	1.52%	1.56%	1.51%	1.39%	1.28%	1.43%	1.42%
Egypt	0.98%	1.42%	1.23%	0.72%	0.60%	0.67%	0.65%	1.12%	1.32%	1.27%	1.21%	1.13%	0.67%
Germany	0.65%	0.69%	1.51%	2.62%	1.23%	1.01%	1.39%	1.19%	1.48%	2.14%	1.50%	1.83%	1.85%
France	0.97%	0.84%	0.85%	1.50%	1.02%	0.84%	1.15%	1.20%	1.04%	1.20%	0.94%	0.75%	0.80%
UK	0.87%	0.99%	1.10%	1.19%	1.10%	1.02%	1.18%	1.56%	0.94%	0.85%	0.62%	0.66%	0.48%
Spain	1.17%	1.28%	1.62%	2.63%	1.55%	1.94%	3.24%	1.29%	1.16%	1.11%	0.96%	0.88%	0.68%
Italy	2.43%	2.72%	2.54%	5.21%	4.29%	11.42%	1.95%	1.75%	2.02%	1.57%	1.23%	0.99%	0.95%
Sweden	0.06%	0.41%	0.12%	0.66%	0.27%	0.32%	0.40%	0.29%	0.85%	1.04%	1.66%	0.68%	0.40%
Switzerland	0.19%	0.26%	0.58%	0.35%	0.37%	0.29%	0.36%	0.39%	0.41%	0.61%	0.62%	1.13%	0.41%
Thailand	0.03%	0.05%	0.26%	0.77%	0.26%	0.53%	0.30%	0.21%	0.22%	1.94%	0.36%	0.81%	0.24%
Turkey	0.46%	1.65%	2.15%	5.15%	2.95%	3.10%	4.31%	5.70%	5.18%	4.78%	3.57%	2.62%	1.98%
China	0.55%	0.75%	1.50%	3.58%	3.99%	2.41%	3.09%	3.76%	3.93%	4.39%	4.42%	4.59%	3.65%
Japan	0.20%	0.28%	0.30%	1.07%	0.39%	1.87%	1.60%	0.81%	0.53%	1.86%	3.36%	3.29%	0.49%
South Korea	0.43%	0.45%	0.76%	1.70%	0.69%	0.43%	0.35%	0.00%	0.14%	0.43%	0.10%	0.41%	0.79%
USA	1.27%	1.11%	1.48%	3.17%	2.53%	2.11%	0.01%	1.83%	1.75%	1.26%	0.84%	0.78%	1.00%
Israel	89.40%	85.94%	81.45%	67.49%	77.65%	70.80%	78.50%	77.34%	77.53%	74.15%	77.35%	78.02%	84.19%

Source: PCBS and authors calculations

**Table 2: Total import weights of selected regions  
(In percentage points)**

<b>Region</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Arab countries	1.34%	2.58%	3.76%	2.90%	1.69%	1.91%	2.17%	2.67%	2.83%	2.66%	2.49%	2.56%	2.09%
Euro area	5.21%	5.53%	6.52%	11.96%	8.09%	15.21%	7.73%	5.44%	5.69%	6.03%	4.62%	4.45%	4.28%
Other Europe	1.12%	1.65%	1.80%	2.20%	1.74%	1.63%	1.94%	2.24%	2.19%	2.50%	2.89%	2.46%	1.29%
Asian countries	1.66%	3.18%	4.98%	12.26%	8.29%	8.35%	9.65%	10.47%	10.00%	13.39%	11.81%	11.73%	7.15%
USA	1.27%	1.11%	1.48%	3.17%	2.53%	2.11%	0.01%	1.83%	1.75%	1.26%	0.84%	0.78%	1.00%
Israel	89.40%	85.94%	81.45%	67.49%	77.65%	70.80%	78.50%	77.34%	77.53%	74.15%	77.35%	78.02%	84.19%

Source: PCBS and authors calculations



**Table 3: Non-oil/non-gas import weights of selected countries**  
(In percentage points)

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Jordan	0.42%	1.30%	2.88%	2.42%	1.27%	1.42%	1.80%	1.86%	1.89%	1.76%	1.77%	2.00%	2.10%
Egypt	1.14%	1.59%	1.40%	0.80%	0.69%	0.77%	0.77%	1.34%	1.66%	1.61%	1.68%	1.58%	0.99%
Germany	0.75%	0.78%	1.72%	2.92%	1.43%	1.16%	1.64%	1.42%	1.85%	2.71%	2.07%	2.56%	2.74%
France	1.12%	0.94%	0.97%	1.67%	1.18%	0.97%	1.37%	1.44%	1.30%	1.52%	1.30%	1.05%	1.18%
UK	1.01%	1.11%	1.26%	1.32%	1.27%	1.18%	1.40%	1.87%	1.17%	1.08%	0.86%	0.92%	0.71%
Spain	1.36%	1.44%	1.84%	2.93%	1.80%	2.23%	3.84%	1.55%	1.45%	1.41%	1.33%	1.23%	1.00%
Italy	2.82%	3.05%	2.89%	5.79%	4.99%	13.16%	2.30%	2.10%	2.53%	1.99%	1.70%	1.38%	1.40%
Sweden	0.07%	0.46%	0.13%	0.74%	0.32%	0.36%	0.48%	0.35%	1.06%	1.32%	2.30%	0.94%	0.60%
Switzerland	0.22%	0.29%	0.66%	0.39%	0.43%	0.34%	0.42%	0.47%	0.51%	0.77%	0.86%	1.57%	0.60%
Thailand	0.03%	0.05%	0.30%	0.85%	0.31%	0.61%	0.36%	0.25%	0.27%	2.45%	0.50%	1.14%	0.36%
Turkey	0.54%	1.85%	2.45%	5.73%	3.43%	3.57%	5.10%	6.82%	6.48%	6.03%	4.96%	3.66%	2.93%
China	0.63%	0.84%	1.71%	3.98%	4.63%	2.77%	3.66%	4.50%	4.93%	5.54%	6.13%	6.41%	5.38%
Japan	0.23%	0.31%	0.34%	1.19%	0.46%	2.16%	1.89%	0.96%	0.66%	2.35%	4.67%	4.60%	0.72%
South Korea	0.50%	0.51%	0.87%	1.89%	0.80%	0.50%	0.42%	0.00%	0.18%	0.54%	0.13%	0.57%	1.17%
USA	1.48%	1.25%	1.69%	3.53%	2.94%	2.43%	0.02%	2.19%	2.19%	1.59%	1.16%	1.08%	1.47%
Israel	87.69%	84.22%	78.89%	63.86%	74.04%	66.37%	74.54%	72.87%	71.85%	67.35%	68.57%	69.31%	76.65%

Source: PCBS and authors calculations

**Table 4: Non-oil/non-gas import weights of selected regions**  
(In percentage points)

Region	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Arab countries	1.55%	2.90%	4.28%	3.23%	1.97%	2.20%	2.57%	3.20%	3.55%	3.36%	3.45%	3.58%	3.09%
Euro area	6.05%	6.21%	7.42%	13.30%	9.40%	17.52%	9.15%	6.51%	7.13%	7.62%	6.41%	6.21%	6.32%
Other Europe	1.30%	1.85%	2.05%	2.45%	2.02%	1.88%	2.30%	2.69%	2.74%	3.16%	4.01%	3.44%	1.91%
Asian countries	1.93%	3.57%	5.66%	13.64%	9.63%	9.61%	11.43%	12.54%	12.53%	16.92%	16.39%	16.38%	10.56%
USA	1.48%	1.25%	1.69%	3.53%	2.94%	2.43%	0.02%	2.19%	2.19%	1.59%	1.16%	1.08%	1.47%
Israel	87.69%	84.22%	78.89%	63.86%	74.04%	66.37%	74.54%	72.87%	71.85%	67.35%	68.57%	69.31%	76.65%

Source: PCBS and authors calculations